Physics

IDENTIFYING STRENGTHS AND WEAKNESSES IN STUDENT UNDERSTANDING OF FORCES AND NEWTON'S LAWS

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Tutorials in Introductory Physics [1] are a well-tested and widely used curriculum in introductory physics classes. Despite this, there are currently few results documenting their effectiveness with students at inner-city universities. We are currently pilot-testing these materials at Chicago State University and assessing whether these materials are effective for our students. In this talk I will focus on our research concerning student understanding of forces and Newton's Laws.

During the past year we have been analyzing student responses to multiple-choice and open-ended questions dealing with topics in dynamics. The multiple-choice questions come from the Force and Motion Concept Evaluation (FMCE) developed by Thornton and Sokoloff [2] and the open-ended questions are adapted from material used by the Physics Education Group at the University of Washington. We characterized student responses to these questions based on the answers and explanations given by the students.

Our results show that the Tutorials seem to have helped students understand some of the prerequisite knowledge for an understanding of Newton's second law. Yet our students still have difficulty transferring this knowledge to the context of dynamics.

[1] McDermott, L.C., Peter Shaffer, and the Physics Education Group at the University of Washington, Tutorials in Introductory Physics, Prentice Hall, First Edition, 2002.

[2] Thornton, Ronald K. and David R. Sokoloff, "Assessing Student Learning of Newton's Laws: The Force and Motion Conceptual Evaluation and the Evaluation of Active Learning Laboratory and Lecture curricula," American Journal of Physics 66, 338-352 (1998).